

Amendment
Serial No. 09/988,272
Attorney Docket No. 981206A

AMENDMENTS TO THE CLAIMS:

Listing of claims:

This listing of claims replaces all prior versions and listings of claims in the application.

1-11. (Canceled)

12. (Currently Amended): A method of fabricating a semiconductor device, comprising the steps of:

forming a drain layer of a first conduction type on a surface of a semiconductor substrate of the first conduction type;

forming a first insulating film on said drain layer;

forming a first conductive layer on said first insulating film;

forming a second insulating film on said first conductive layer;

patterning said second insulating film, said first conductive layer, and said first insulating film, to form a gate insulating film from said first insulating film, and a gate electrode from said first conductive layer;

implanting an impurity of a second conduction type opposite to the first conduction type into a surface of said drain layer using a gate electrode as a mask, thereby forming a channel region of the second conductive type;

implanting an impurity of the first conduction type into said channel region using said gate electrode as a mask, thereby forming an impurity region of the first conduction type;

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forming a third insulating film of one layer so as to cover a surface of the impurity region, said walls of said gate insulating film, said gate electrode, and said second insulating film, and an upper face of said second insulating film;

etching back said third insulating film to form a side wall insulator of said third insulating film, by maintaining said third insulating film selectively on side walls of said gate insulating film, said gate electrode, and said second insulating film and at the same time [[;]]
~~—— etching the impurity region to~~ form a recess so as to penetrate the impurity region, thereby forming a source region of the impurity region; and

forming a second conductive layer on an entire surface, and patterning said second conductive layer, thereby forming a wiring layer.

13. (Previously Presented): The method of fabricating a semiconductor device, according to the claim 12, further comprising a step of:

introducing an impurity of the second conduction type into the bottom of the recess to form a body contact region of the second conduction type after etching the impurity region prior to forming a second conductive layer.

14. (Currently Amended): A method of fabricating a semiconductor device, comprising the steps of:

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forming a drain layer of a first conduction type on a surface of a semiconductor substrate of the first conduction type;

forming a first insulating film on said drain layer;

forming a first conductive layer on said first insulating film;

forming a second insulating film on said first conductive layer;

patterning said second insulating film, said first conductive layer, and said first insulating film, to form a gate insulating film from said first insulating film, and a gate electrode from said first conductive layer;

implanting an impurity of a second conduction type opposite to the first conduction type into a surface of said drain layer using a gate electrode as a mask, thereby forming a channel region of the second conductive type;

implanting an impurity of the first conduction type into said channel region using said gate electrode as a mask, thereby forming an impurity region of the first conduction type;

forming a third insulating film of one layer so as to cover a surface of the impurity region, said walls of said gate insulating film, said gate electrode, and said second insulating film, and an upper face of said second insulating film; The method of fabricating a semiconductor device, according to the claim 12, wherein the etching step comprises the steps of:

formulating a mask pattern having an opening located in a center of the impurity region and covering an entire surface except for the opening before etching the impurity region;

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etching the impurity region by using the mask pattern to form a recess deeper than the impurity region, thereby forming a source region of the impurity region remaining; ~~and~~

introducing an impurity of the second conduction type into the bottom of the recess to form a body contact region of the second conduction type;

then etching back said third insulating film to form a side wall insulator of said third insulating film, by maintaining said third insulating film selectively on side walls of said gate insulating film, said gate electrode, and said second insulating film; and
forming a second conductive layer on an entire surface, and patterning said second conductive layer, thereby forming a wiring layer.

15. (Original): The method of fabricating a semiconductor device, according to the claim 12, further comprising the steps of:

forming a fourth thick insulating layer on a surface of the semiconductor substrate; and

patterning the fourth thick insulation layer so as to remain a peripheral region of the substrate, prior to forming the drain region.

16. (Withdrawn): A method of fabricating a semiconductor device, comprising the steps of:

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forming a drain layer of a first conduction type on a surface of a semiconductor substrate of the first conduction type;

introducing an impurity of a second conduction type opposite to the first conduction type into an entire surface of said drain layer, thereby forming a channel layer;

forming a trench so as to penetrate said channel layer and reach said drain layer using a first mask;

forming a first insulating film on an inner wall of said trench and a surface of said channel layer;

forming a conductive layer on said first insulating film;

forming a second insulating film on said conductive layer;

patterning said second insulating film, said conductive layer, and said first insulating film with using a same second mask, to form a gate insulating film of said first insulating film, and a gate electrode of said conductive layer;

implanting an impurity of the first conduction type into a surface of said channel layer with using said gate electrode as a mask, thereby forming a impurity region of the first conduction type;

forming a third insulating film on an entire surface;

etching back said third insulating film to form a side wall insulator which covers side walls of said gate insulating film, said gate electrode, and said first insulating film;

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forming a third mask having an opening located in a center of the impurity region and cover an entire surface except for the opening, before etching the impurity region;

etching the impurity region by using the third mask to form a recess to penetrate the impurity region and reach to the channel region, thereby forming a source region of the impurity region; and

implanting an impurity of the second conduction type into a bottom of said recess, with remaining said third mask, thereby forming a body contact region; and

removing said third mask; and

forming a second conductive layer which covers said source region, said body contact region, said side wall insulator, and said second insulating film, and patterning said second conductive layer by using a fourth mask, thereby forming a wiring layer.

17. (Withdrawn): The method of fabricating a semiconductor device according to claim 16, wherein said step of forming a source region is formed before the step of forming a trench.

18. (Withdrawn): The method of fabricating a semiconductor device according to claim 16, wherein the gate electrode is formed on the first insulating film to fill the trench and to cover the periphery of the trench formed on the channel region.

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19. (Withdrawn): The method of fabricating a semiconductor device according to claim 16, wherein the opening of the third mask is formed smaller than a region of the impurity region between the adjacent sidewall insulators.

20. (Withdrawn): The method of fabricating a semiconductor device according to claim 16, wherein the source is separated from the trench.

21. (Withdrawn): The method of fabricating a semiconductor device according to claim 16, wherein an upper surface and a side surface of the source region are directly contacted with the wiring layer.

22. (Previously Presented): The method of fabricating a semiconductor device according to claim 12, wherein an upper surface and a side surface of the source region are directly contacted with the wiring layer.

23. (Previously Presented): The method of fabricating a semiconductor device according to claim 14, wherein the opening of the mask pattern is formed smaller than a region of the impurity region between the adjacent sidewall insulators.

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24. (Previously Presented): The method of fabricating a semiconductor device according to claim 12, wherein the third insulating film is formed in one step.